

Violent Crime in America: A look at Factors Affecting Crime Levels in U.S. Cities

An Honors Thesis (ECON 424)

by

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Abstract

It seems that, in recent years, the number of violent crimes has been increasing in cities around the United States. This research paper will look at a couple of factors that I believe have some impact on this number. I believe that the percent of people who own a gun and the number of police officers a city employs can lower the number of violent crimes within an area. Both topics are heavily debated and I hope to shed some light on what the facts are. I will be using data regarding the demographics of cities to perform a regression analysis to determine the likelihood that these variables have an effect on violent crime.

Acknowledgements

I would like to thank Dr. Liu for all of his help throughout this process and for giving me a chance to research a topic that I truly was interested in. Without his help, I never would have been able to produce a product that I am as proud of as I am this one.

Process Analysis Statement

When trying to come up with a topic, I was watching the news with my father and every story, but two, were stories about some violent crime that someone had committed. My dad made the comment that it seemed like that is all the news talks about anymore which made me wonder if that was because it just makes for interesting news or if it was because there were more of these crimes happening. I decided that I wanted to look in to violent crime, from the aspect of there being more happening, and try and see if I could find factors that were affecting this number.

From there, when thinking about what factors I would investigate, I remembered reading an article discussing the gun control debate. In this article, one of the arguments for more gun control was that the more people who owned guns, the more crimes that would be committed. However, nowhere in this article was there a mention of where this information came from. This made me want to investigate this notion to see if it was true. Another article that I had read was about an argument going on in Chicago regarding the number of police officers employed in the city. One of the arguments, as you will see in my paper, is that some believe that having more police officers would not make much of a difference in the crime level and it would just be money wasted by the city. At first, when I heard this, I thought there was no way that could be right. The more police officers there were on a force, the more police officers available to patrol for crimes. Then, while in class one day, this was brought up and my professor explained the economics behind it. However, I wanted to see if the data corroborated this idea.

I had never worked on a project of this level before and I had never analyzed data to reach conclusions. I was both excited and nervous to undertake this project. I wanted this project to be a culmination of everything I had learned while at Ball State. I was most excited about getting to use *EViews* and analyze the results because I feel that that is one of the most important things that I learned during my time here. I will be able to take that knowledge with me and use it in my future jobs.

It wasn't just the analyzation that was important though. Going through the steps of researching, and finding all the data that I needed to complete my project, was beneficial too. Knowing how to research and where to find information is an important part of analyst's jobs and by going through the steps for this project, I am able to say that I have experience with that. I ended up really enjoying working on this project and it has helped me gain some confidence in myself that I can do something like this and that I did learn something in my time here.

If I could do one thing differently regarding my project, I would use more variables and have a larger sample size. This would not necessarily change my findings, but it would make my findings all the more accurate. When there are other variables that may have an effect on the dependent variable, but are not included in the model, the results may not accurately represent the effect that the included variables actually have. A larger sample size would just be more representative of the population.

The variables I would include would be the number of children in foster care, the percent of the population that is considered a minority, the percent of the population that have a bachelor's degree, whether or not it is a Republican or Democratic state, the divorce rate, and

whether or not the state allows the death penalty to be used. I believe that all of these factors have some influence on the level of crime in an area and that, since they are not included in my original model, they are causing my data to be less accurate. I would also choose to include more rural areas as well. My data is based on the largest cities in America and may not be an accurate representation of what happens in the lower populated areas.

I: Introduction

In recent years, it has seemed that the number of violent crime related stories one hears about in the news or from other media sources has increased dramatically. Every other story seems to be about someone who was murdered or raped or assaulted. There is a never-ending list of crimes to be reported. This makes it seem as if the number of violent crimes that are occurring has been on the rise. According to the FBI, violent crime is composed of four offenses: murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault” and “as those offenses which involve force or threat” (FBI, 2010) . If the number of these crimes are really increasing, there is a greater threat to the lives of citizens. This paper is going to investigate 4 different factors that may influence the number of violent crime in an area which would be of value to government officials as they can then see if there is anything that they can do to lower the number of these crimes and lower the risk to their citizens. They will be able to see if any one factor would dramatically decrease the number of violent crimes or, on the contrary, if any factor is dramatically increasing the number of violent crimes in an area. This paper is going to be focusing on the population size, average income, number of police officers, and the percentage of gun owners to see the affects each of these variables has on the number of violent crimes and to see if any individual factor has a greater effect than any of the others.

One of the biggest arguments going on in Washington D.C. is regarding gun control. Who should be allowed to own guns? What kind of guns should people be able to purchase? Most Democrats want much stricter laws when it comes to gun control. They want to limit the kind of guns that a person is legally allowed to own and they want to make the process of obtaining a new gun a longer and more extensive one. On the other side of the barrel, most

Republicans believe that it is every citizens' right to obtain, own, and use a firearm.¹ Along with these arguments is the argument about whether or not increasing the number of people who own guns will increase the number of violent crimes that are committed in a community. One of the main goals of this paper is to help shed some light on the correlation between violent crime and the amount of gun owners.

Another disagreement in society these days is regarding the number of police officers on a force and whether or not having a higher number employed means that the number of crimes is reduced. One side of the argument claims that having more officers on the force means that there will be more officers available to patrol areas and, potentially, prevent crimes from happening. The other side of that argument claims that there is such a thing as over-policing and with this comes more problems than it does good. Economically, some crime is efficient. It would cost way too much to be able to stop every crime. This would almost require one police officer per regular citizen and this is just not realistic. At some point, the cost of hiring more police officers will outweigh the benefit that that one police officer brings. The president of the Police Foundation said that "once a police department reached a needed minimum number of police officers, the equation was not as simple as more police equals less crime" (Davey, 2016). Let's say that up to this minimum number of police officers, for every new police officer, one less crime was reported. Once we went over this minimum threshold, the equation may drop to one police officer means .4 less crimes² and so on due to external

1 They do not believe that every citizen SHOULD own a firearm, but they believe that the government should not alter the right to own a firearm for any citizen

2 This example was just created to help audience members understand the before statement and in no way reflects the accurate statistics regarding police officers and crime.

factors. A city must look at data like this to determine if the cost of hiring one more police officer is less than the benefit the city and the people will receive from having this one more police officer. If the cost does not outweigh the benefit, the city will not hire anymore officers.

II: Study of Literature

Crime and the factors contributing to how many crimes are committed is a topic that is discussed fairly often and there have been multiple people who have researched and looked into this topic. They are all different and a lot of them come with different conclusions. However, this may all be dependent upon how they format their paper and their models. If they are looking at data over a longer period of time, they may get different results than a person who looks at data over a couple months. If they look at rural areas, they may get different results than people who study urban areas. Finally, no paper has been able to look at every possible factor that contributes to crime. The model would include hundreds of variables and some variables just are not able to be tested for. The readers need to realize this when they start to read a paper, so that they will understand that there may be more factors that are at work than what is being shown in the paper and that the data may not be completely accurate because of this.

Each paper that I read and used for the basis of my research studied one area of crime factors. For example, Songman Kang, when writing "Inequality and Crime revisited: effects of local inequality and economic segregation on crime" focused on the monetary factors. This means that he focused on how money, or the absence of, affected the crime level in an area. In his paper, Kang used data from the largest 200 counties in the United States from 1990, 2000,

and 2005-2009. He, then, went further into breaking down the data by looking at characteristics such as: "population, race distribution, unemployment and poverty rates, shares of female-headed households, and college graduates" (Kang, 2016). He chose the areas that he chose based upon "high residential segregation and crime concentration in large urban counties" (Kang, 2016). He also interprets violent crime to be one of seven types of crime- murder, robbery, motor vehicle theft, burglary, rape, aggravated assault, and larceny. After gathering his data, Kang found that, in recent decades, income has been steadily increasing across all the counties studied. On the other hand, Kang found that the number of violent crimes committed within these counties had been steadily decreasing throughout the years. That held true for all seven classifications Kang gives for violent crime. He used one main regression model to perform all of his regression analysis with.

For the next factor that I wanted to research, number of gun owners, I read "Gun Availability and Violent Crime: New Evidence from the National Incident-Based Reporting System" by Lisa Stolzenberg and Stewart J. D'Alessio. In this paper, the authors looked into how the number of guns in an area affected the amount of crime that was committed. They provided the two perspectives that formed the basis of their research. The first "maintains that gun availability increases levels of violence" (Stolzenberg & D'Alessio , 2000). The second perspective says the opposite of the first "because the ownership of guns by law-abiding citizens acts as a deterrent to crime" (Stolzenberg & D'Alessio , 2000). The authors, then, go on to discuss how there has been extensive research done regarding this topic but every possible finding- positive correlation, no correlation, or negative correlation- has been found. The authors use these past findings and better it in order to see if they would be able to find a

definitive, final answer. For their research, the authors used four different dependent variables. The first dependent variable used was violent crime rate. This was “measured as the number of violent felony offenses divided by the county population and multiplied by 100,000” (Stolzenberg & D'Alessio , 2000). The authors define violent crimes as “murder and nonnegligent manslaughter, kidnapping/abduction, forcible rape, forcible sodomy, sexual assault with an object, forcible fondling, robbery, aggravated assault, and extortion/blackmail” (Stolzenberg & D'Alessio , 2000). The other dependent variables were gun crime rate, youth gun crime rate, and knife crime rate. The authors, then, used illegal gun availability and legal gun availability as the independent variables with divorce rate, percentage of high school dropouts, population density, lagged juvenile commitment rate, lagged arrest rate, lagged unemployment rate, and Aid to Families with Dependent Children as control variables. A two-way fixed-effects model was used to estimate the effects these variables had on the dependent. They chose to use this model as it “controls for the effects of both measured and unmeasured differences between counties that do not change over time” (Stolzenberg & D'Alessio , 2000). The authors found illegal gun ownership to have an effect on the violent crime level but they found legal gun availability to be “trivial in magnitude and not of substantive importance” (Stolzenberg & D'Alessio , 2000) meaning that it is largely insignificant. They obtained these results in models 2 and 3, as well. Model 4 did not reveal any of the variables to be significant. They reached the conclusion that legal gun availability had not effect on the violent crime rate.

I, next, read a paper by James J. Nolan titled “Establishing the statistical relationship between population size and UCR crime rate: Its impact and implications.” Nolan wanted to see if there was any relationship between the population size of an area and the number of violent

crimes that are committed. The author gathered crime statistics from 1,294 cities that had populations greater than 25,000. He, first, evaluated the cities as one group. Then, the cities were split into four separate groups based upon their population. Group 1 included cities with populations between 250,000 and up. Group 2 were cities with populations between 100,000 and 249,999. Cities with populations between 50,000 and 99,000 were put into group 3 and the remaining cities, with populations between 25,000 and 49,000, were put into group 4. The author states his reasoning behind writing this paper and performing these data analyses is to help clear up confusion for the media and general population. When the Uniform Crime Reports (UCR) are released, there are two main formats to the data. There is crime *volume* and crime *rate*. He defines crime volume as "simply a count of the number of crimes that occurred in a specific jurisdiction in a given year" and crime rate as "a relativized number that presents crime on a per capita basis" (James, 2004). The reason for the confusion is simple. The media, when they get a hold of this data, will simply use the crime volume to report which jurisdiction has more crime. They fail to report the crime rate which actually gives better insight since it is a per capita measurement. A jurisdiction with a higher population will most likely always have a high crime volume but it may not have as many crimes per capita as another jurisdiction. In this case, the jurisdiction with the higher crime rate would be the more dangerous place. Nolan looked at the difference between the crime rate and the average crime rate to determine whether the relationship was positive or negative. If it was positive, this would mean that the correlation between the crime rate and the population was positive. If the difference was negative, this could mean that the lesser populated areas had the higher crime rate which could lead us to believe that as a population grew, the safer it is to live in that area. When studying all

the cities as a group, he found the difference between the crime rate and the average crime rate to be positive- as was the difference when examining groups 2,3, and 4. However, when looking at group 1, the difference between crime rate and average crime rate yielded a negative result. Nolan had to determine if these relationships were significant so he performed a linear regression of crime rate, violent crime rate and property crime rate with respect to population. He did this using the same five groups as he did before. He found that when looking at all the cities together, all 3 crime rates had a positive and significant relationship with population. The same was found to be true with the group 2 cities. This means that as populations increase, a person can expect to see higher levels of all three types of crime studied. However, this was not the case in the rest of the groups. When examining group1, it was found that while there was a negative relationship between population and crime rate, it was not statistically significant. While violent crime was also found to be not related to population size, property crime was found to have a negative relationship. This means that one could expect to find higher levels of property crime in less populated areas. In group 3, the violent crime rate was the only one that was found to be related to population and it was found to have a positive relationship. So, as population grows, one can expect higher levels of violent crime. Finally, it was found that crime rate was not related to population an any way when looking at group 4. The author concluded that population and the crime rate were definitely related. What kind of a relationship- positive or negative- depended on the jurisdiction being looked at.

The final paper that I looked at was written by John MacDonald, Jeffrey Fagan, and Amanda Geller and is titled "The Effects of Local Police Surges on Crime and Arrests in New York

City.” As the title suggests, this paper considered how the number of police officers affected crime levels. There have been a lot of debates about whether the number of police officers has a substantial effect on the crime level in an area. This paper also considered whether more investigative stops would be sufficient in lowering the amount of crime in an area. What they have done is separate New York’s police jurisdictions into hotspots- hotspots being where there has been a large level of crime reported in that area. Once they determined where these hotspots were located, and which areas have very little crime reported, they had the police stations start to assign more officers into the hotspot areas and fewer in the lower crime areas. By doing this, the authors were hoping they would be able to see if there was a difference, or not, in the areas where a higher number of police officers were located.

III: Model

The purpose of this model is to determine whether or not there is a relationship between violent crime and population, gun ownership, income, the number of police officers on the force and/or ratio of people per police officer. With our model, we will be able to test if these variables are significant. We will, then, need to look at our model and make sure that what we have predicted is justified by our findings.

We will be looking at one linear model with a dependent variable and 5 independent variables. This model is based upon what was found in each of the papers that I read. I will be testing to see if I get the same results as the authors of those papers. The dependent variable will be the number of violent crimes committed in an area, while the 5 independent variables

will be population, the percentage of gun owners, average income for the area, the total number of police officers on their police force, and the ratio of people per 1 police officer.

The idea that a larger population means a higher level of violent crime is not far-fetched. More people would mean that there would be more people who could potentially commit a crime. For this variable, I expect the coefficient to be positive. As the population increases, I would expect the number of crimes to increase.

When looking at average income, we are really looking at how much of an incentive one has to commit a serious crime. The more money a citizen has access to the less need they have to commit a crime. This refers to the burglary or robberies that are placed into the violent crime category. This would suggest that the coefficient for average income would be negative which would mean that as the average income of an area increased, the number of violent crimes would decrease.

One thought, regarding gun ownership, is that the more people who own a handgun legally, the less number of crimes that would be committed. This would be because the criminals would realize that there is a greater chance that someone they are going to attack may be carrying a gun and could retaliate. Due to this idea, I would expect the coefficient for the variable, regarding the percentage of gun owners, to be negative. This would propose that as the percent of the population who own guns increases, the number of violent crimes that happens in that area will decrease.

If one were to sit and think about it, it seems logical that having more police officers on the force would decrease the amount of crimes that are committed as there will be more police officers to monitor and patrol the streets, possibly stopping crimes before they even occur. Due

to this logical thinking, I would expect to find that the coefficient for police officers would be negative. This would also hold true when looking at the ratio of citizens to police officers. The less people you have per one police officer, the lower the crime rate should be, if you followed the logic from before.

This leads to the formation of our model:

$$VLNTRM_s = \beta_0 + \beta_1 POP_s + \beta_2 AVGINC_s + \beta_3 PERGUN_s + \beta_4 NUMOFF_s + \beta_5 PPRATIO_s + u$$

Where:

<i>s</i>	State
<i>VLNTRM</i>	The number of violent crimes committed in the area
<i>POP</i>	The population of the city/area
<i>PERGUN</i>	The percent of the population who own guns in the area
<i>NUMOFF</i>	The number of police officers on the city's police force
<i>PPRATIO</i>	The ratio of people to police officers

This model will be tested to see if there is a correlation between any of the variables and if any of the variables are statistically significant with regards to violent crime. I will be testing for heteroscedasticity, multicollinearity, and serial correlation.

I gathered my data from a few different sources that report information of cities around the United States. I chose to use data from the 100 largest cities in America. However, after reviewing my data, I found that two of the cities had split their population information into two different parts (Northern San Francisco vs Southern San Francisco for example), so for these cities I combined the cities and the data into one city bringing my total number of cities down to 98. I retrieved the information regarding the population of the cities from *city-data.com*. The information regarding the average income of the cities came from *Forbes*.

Demographicdata.org provided me with the statistics and numbers about gun ownership. My fourth and final independent variable data, number of police officers, came from *Governing.com*. Using this data, I divided the population number by the number of police officers on the force in order to determine the ratio of citizens to police officers. For my dependent variable, I used *Chicago.cbslocal.com* to gather the data on the number of violent crimes that were committed in each of the cities that I gathered data on. I will use the regression software *EViews* to formulate an estimated regression equation to determine the significance level of the variables in respect to violent crime rate.

IV: Empirical Studies

After running my analysis on my first model, *EViews* produced the following descriptive statistics. I also had *EViews* produce the equations³

Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
<i>VLNTRM</i>	5,193.39	6,667.73	3	50,564
<i>AVGINC</i>	60,671.51	11,105.56	34,002	99,600
<i>PERGUN</i>	30.27	10.92	0.42	57.8
<i>POP</i>	738,383.2	994,821.2	258,522	8,491,079
<i>NUMOFF</i>	5,688.84	13,428.25	107	59,100
<i>PPRATIO</i>	406.01	377.72	5.05	3,519

³ (1) in results table

Correlation Matrix

	<i>AVGINC</i>	<i>PERGUN</i>	<i>POP</i>	<i>NUMOFF</i>	<i>PPRATIO</i>
<i>VLNTRM</i>	0.095	-0.093	0.920	0.454	-0.343
<i>AVGINC</i>	1.000	-0.127	0.144	-0.127	0.170
<i>PERGUN</i>	-0.127	1.000	-0.190	-0.282	0.255
<i>POP</i>	0.144	-0.190	1.000	0.524	-0.253
<i>NUMOFF</i>	-0.127	-0.282	0.524	1.000	-0.576
<i>PPRATIO</i>	0.170	0.255	-0.253	-0.576	1.000

VIF

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
<i>AVGINC</i>	000.746	41.82894	1.123026
<i>PERGUN</i>	615.3510	9.746092	1.142441
<i>POP</i>	9.01 E -08	2.293422	1.472237
<i>NUMOFF</i>	0.000714	2.411846	2.032303
<i>PPRATIO</i>	3171402	8.159454	1.553074
<i>C</i>	3849762	58.47676	NA

When looking at the correlations between the variables, in the table above, I found that there was a strong correlation between the dependent variable, Violent Crime, and the Population variable. There is also a fairly large correlation between the number of police

officers and the ratio of people to police officers and between the population and the number of police officers. This is a sign that there could be a multicollinearity problem. So, I found the Variance Inflation Factors and found that none of them were greater than 10, which means we do not have a multicollinearity problem. This shows that none of my independent variables have a linear relationship between them. Then, when testing for heteroscedasticity⁴, I found that the errors are heteroscedastic. To see if I could solve this problem, I retrieved the White heteroscedasticity-consistent standard errors and statistics⁵ which resulted in a new model ⁶. I found that, in both models, every independent variable, with the exception of Average Income, was statistically significant at the 5% level. Average income was not significant in either model so I ran a Redundant Variable Test and found that Average Income is a redundant variable. This means that it does not need to be included in the model. Taking average income out of the model produces new coefficients and standard errors⁷

Because none of the data that I used was not collected over a series of time periods, I did not need to test for serial correlation.

⁴ From **Table 1**

⁵ From **Table 2**

⁶ (2) in results table

⁷ (3) in results table

Results Table

Independent Variables	(1)	(2)	(3)
<i>AVGINC</i>	-0.009 (0.027)	-0.009 (0.018)	— —
<i>PERGUN</i>	60.558 (24.806)	60.558 (23.473)	62.062 (24.275)
<i>POP</i>	0.006 (0.0003)	0.006 (0.0004)	0.006 (0.0002)
<i>NUMOFF</i>	-0.070 (0.027)	-0.070 (0.030)	-0.068 (0.026)
<i>PPRATIO</i>	-7.668 (1.781)	-7.668 (1.647)	-7.745 (1.757)

V. Conclusion

From the tests that I performed, it can be concluded that the population does have a significant impact on the number of violent crimes that occur in an area. The number of police officers on a city's police force does not have any effect on the number of crimes in a city. However, when looking at the ratio of people to police officers, I found that this does have an effect on the number of violent crimes. My model, however, does not give the ideal proportion of people to police officers. Some would argue that one to one would be ideal and while that may get rid of the crime in an area, it is not a realistic possibility. Average income may have an effect on the violent crime level, but more testing would need to be done in order to know for

sure. The same holds true for the percentage of residents who own a gun. While my model does show the possibility, it may not encompass all of the variables that may be affecting the crime levels. More testing will have to be done on all variables in order to get an accurate representation of how much of an impact they have on the crime level in a city.

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Appendix**Table 1: Heteroscedasticity Test for Model 1**

Heteroskedasticity Test: White

F-statistic	3.028572	Prob. F(20,66)	0.0004
Obs*R-squared	41.63432	Prob. Chi-Square(20)	0.0031
Scaled explained SS	65.18686	Prob. Chi-Square(20)	0.0000

Test Equation:
 Dependent Variable: RESID^2
 Method: Least Squares
 Date: 05/04/17 Time: 09:27
 Sample: 1 97
 Included observations: 87

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4221689.	31629910	-0.133471	0.8942
AVGINC^2	-0.002532	0.007459	-0.339435	0.7354
AVGINC*PERGUN	-9.836627	10.16861	-0.967352	0.3369
AVGINC*POP	0.000163	0.000622	0.262086	0.7941
AVGINC*NUMOFF	-0.007822	0.038225	-0.204617	0.8385
AVGINC*PPRATIO	0.757353	0.872641	0.867886	0.3886
AVGINC	190.8892	892.9155	0.213782	0.8314
PERGUN^2	11540.19	10005.31	1.153406	0.2529
PERGUN*POP	0.822133	0.425680	1.931340	0.0577
PERGUN*NUMOFF	-38.84776	98.66402	-0.393738	0.6950
PERGUN*PPRATIO	-425.2663	912.4531	-0.466069	0.6427
PERGUN	-256160.7	668710.3	-0.383067	0.7029
POP^2	1.47E-06	1.57E-06	0.931578	0.3549
POP*NUMOFF	-0.000626	0.000476	-1.314084	0.1934
POP*PPRATIO	-0.073788	0.036146	-2.041381	0.0452
POP	504.3184	1135.478	0.444146	0.6584
NUMOFF^2	0.004707	0.073240	0.064265	0.9490
NUMOFF*PPRATIO	-498.8802	1095.371	-0.455444	0.6503
NUMOFF	1373.101	6177.087	0.222289	0.8248
PPRATIO^2	-20.55805	57.45842	-0.357790	0.7216
PPRATIO	11843.95	79946.38	0.148149	0.8827
R-squared	0.478555	Mean dependent var	5332558.	
Adjusted R-squared	0.320542	S.D. dependent var	10194115	
S.E. of regression	8402933.	Akaike info criterion	34.93257	
Sum squared resid	4.66E+15	Schwarz criterion	35.52778	
Log likelihood	-1498.567	Hannan-Quinn criter.	35.17224	
F-statistic	3.028572	Durbin-Watson stat	2.461932	
Prob(F-statistic)	0.000377			

Table 2: Solution for Heteroscedasticity

Dependent Variable: VLNTRM

Method: Least Squares

Date: 05/04/17 Time: 09:53

Sample (adjusted): 1 97

Included observations: 87 after adjustments

White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AVGINC	-0.009254	0.017690	-0.523136	0.6023
PERGUN	60.55786	23.47296	2.579899	0.0117
POP	0.006229	0.000361	17.25058	0.0000
NUMOFF	-0.069792	0.029931	-2.331752	0.0222
PPRATIO	-7.667562	1.646961	-4.655581	0.0000
C	2629.142	1407.082	1.868507	0.0653
R-squared	0.881367	Mean dependent var	5483.759	
Adjusted R-squared	0.874044	S.D. dependent var	6743.342	
S.E. of regression	2393.233	Akaike info criterion	18.46515	
Sum squared resid	4.64E+08	Schwarz criterion	18.63521	
Log likelihood	-797.2340	Hannan-Quinn criter.	18.53363	
F-statistic	120.3554	Durbin-Watson stat	2.543976	
Prob(F-statistic)	0.000000	Wald F-statistic	90.54597	
Prob(Wald F-statistic)	0.000000			